

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets

(11)



EP 0 939 236 A1

(12)

## EUROPEAN PATENT APPLICATION

(43) Date of publication:  
01.09.1999 Bulletin 1999/35

(51) Int. Cl.<sup>6</sup>: F16B 37/14, B60B 7/06

(21) Application number: 99102819.2

(22) Date of filing: 26.02.1999

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE  
Designated Extension States:  
AL LT LV MK RO SI

(30) Priority: 26.02.1998 US 31437

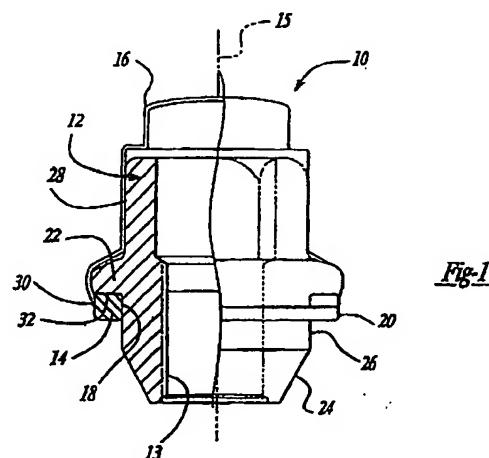
(71) Applicant: JPE, INC.  
Ann Arbor, MI 48108 (US)

(72) Inventor: Wilson, Larry J.  
Commerce Township, Michigan 48382 (US)

(74) Representative:  
Hoeger, Stellrecht & Partner  
Uhlandstrasse 14 c  
70182 Stuttgart (DE)

### (54) Wheelnut/cap assembly with insulating washer

(57) An improved capped wheelnut (10) of the type including a nut body (12) having a central threaded aperture (13) and a pair of ends, one end (24) being adapted to engage a wheel, and a cap (16) for said nut body at the other end. The cap has an end wall (29) and a continuous side wall (31) which terminates intermediate the ends of said nut body in an annular edge (30), an insulating washer (14) constructed of material having low heat conductivity, said washer being of annular ring shape and positioned on said nut adjacent the lower end of said cap, a portion of said cap being engaged with said washer so as to maintain said washer in engagement with said nut body so that it will not fall off the nut.



EP 0 939 236 A1

BEST AVAILABLE COPY

**Description****BACKGROUND OF THE INVENTION**

[0001] This invention relates generally to wheel-nut/cap assemblies of the type illustrated in U.S. Patent 4,813,835 assigned to the owner of this invention and more particularly to such an assembly with an integral washer for insulating the wheel cover from the wheel-nut.

[0002] The use of plastic trim components on wheel assemblies offers significant cost reduction over metal components. Plastics also make possible intricate designs either not feasible or too costly to implement with metal components. Consequently, designs utilizing plastic wheel covers or hub caps have proliferated among the automobile manufacturers and their suppliers. Methods of attachment to the wheel vary, using some metal components integral with the cover to provide attachment directly to the wheel or by means of the wheel nuts (referred to as "bolt-on" design.) Attachment of the cover with wheelnuts has proven to be the most cost effective method of attachment. However, it also places the most constraints on styling design. This is due to the heat generated by the brake rotor. Lack of ventilation or heat sinking can cause distortion of the plastic cover, resulting in looseness and noise and/or cosmetic damage. In the case of bolt-on designs, this heat has a direct path through the wheel stud, to the wheelnut, and into the plastic cover.

[0003] This invention effectively deals with the heat issue in the bolt-on design by using a plastic washer to insulate the cover from the wheelnut. This invention is a low cost method of achieving attachment of the washer to the wheelnut.

**SUMMARY OF THE INVENTION**

[0004] This invention consists of a three component assembly. First, an inner component, namely, a nut, that serves the traditional purpose of wheel attachment and additional features for accommodating the attachment of a second component, a washer made of plastic, nylon, or some other material of low heat conductivity. The third component is a cap appropriately complementing the nut geometry and engaging the outer diameter of the washer so as to retain it on the nut. This cap is "crimped" or mechanically compressed to hold the washer sufficiently so as to prevent it from falling off the assembly. The preferred cap material in this case is stainless steel, but other metals or metal alloys can be used. The attachment of the cap to the nut can be varied, utilizing welding, bonding with adhesive, soldering, etc.

[0005] Further objects, features and advantages of the invention will become apparent from a consideration of the following description and the appended claims when taken in connection with the accompanying draw-

ings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0006]

FIG. 1 is a elevational view of the capped wheelnut of this invention, with parts broken away and shown in section; and

FIG. 2 is a perspective view of the capped wheelnut of this invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

[0007] With reference to the drawing, the capped wheelnut assembly of this invention, indicated at 10, is of the general type shown in Patent 4,813,835 and includes a nut 12 having a threaded aperture 13 and a longitudinal axis 15. The assembly 10 also includes a washer 14 and a cap 16.

[0008] The nut 12 serves the traditional purpose of wheel attachment and additional features for accommodating the washer 14 and the cap 16. The washer 14 is made of plastic, nylon, or other material of low heat conductivity. The washer 14 is of annular ring shape having an inner diametrical side 18 and an outer diametrical side 20.

[0009] The nut 12 consists of a metal body 22 having an inner end terminating in a conical surface 24 that is adapted to mate with the conical depressions typically formed around stud holes in vehicle wheels. The conical section 24 terminates in a short cylindrical land 26. The land 26 in turn terminates in an annular surface 32 which bends radially outwardly of the axis 15 and locates the washer 14 where it will insulate a plastic cover from the high heat of the nut body 22.

[0010] The nut body 12 at its outer end also has a plurality of wrench flats 28 arranged generally parallel to the axis 15 of the nut body. It is conventional to provide six such wrench flats and thus in an end view the nut body is of the hexagonal configuration.

[0011] The cap 16, in addition to performing its ornamental function and its function of protecting the wheelnut 12, appropriately complements the nut geometry and extends at its lower end to a position in which it engages the outer side 20 of the washer 14. The cap 16 is crimped or mechanically compressed to hold the washer 14 sufficiently so as to prevent it from falling off the assembly. More particularly, the cap 16 has an end wall 29 and a continuous side wall 31 which terminates in an annular edge 30. The edge 30 engages the washer 14 so that the washer 14 is clamped between the cap edge 30 and the land 26.

[0012] The cap 16 is preferably made of stainless steel but can be made from other metals or metal alloys. The cap 16 is firmly secured to the nut 12 by welding, bonding with adhesive, solder, or the like (not shown).

**BEST AVAILABLE COPY**

[0013] Due to the heat generated by the wheel brake rotor, and the fact that this heat has a direct path through the wheel stud to the wheelnut, any plastic wheel cover is subject to deformation. In the present case, the washer 14 functions to insulate the nut 12 from the wheel cover (not shown) which is associated with the motor vehicle wheel (not shown) which is being secured to the vehicle by the wheelnut 10.

[0014] It is to be understood that the invention is not limited to the exact construction illustrated and described above, but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the following claims.

5

10

15

#### Claims

1. An improved capped wheelnut of the type including a nut body having a central threaded aperture and a pair of ends, one end being adapted to engage a wheel, and a cap for said nut body having an end wall and a continuous side wall which terminates intermediate said ends of said nut body in an annular edge, an insulating washer constructed of material having low heat conductivity, said washer being of annular ring shape and positioned on said nut adjacent the lower end of said cap, a portion of said cap being engaged with said washer so as to maintain said washer in engagement with said nut body so that it will not fall off the nut.

20

25

30

2. The capped wheelnut of claim 1 wherein said nut body has a cylindrical land between said ends and an annular surface extending radially outwardly from said surface, said washer being in engagement with said annular surface and being clamped between said annular edge of said cap and said nut body.

35

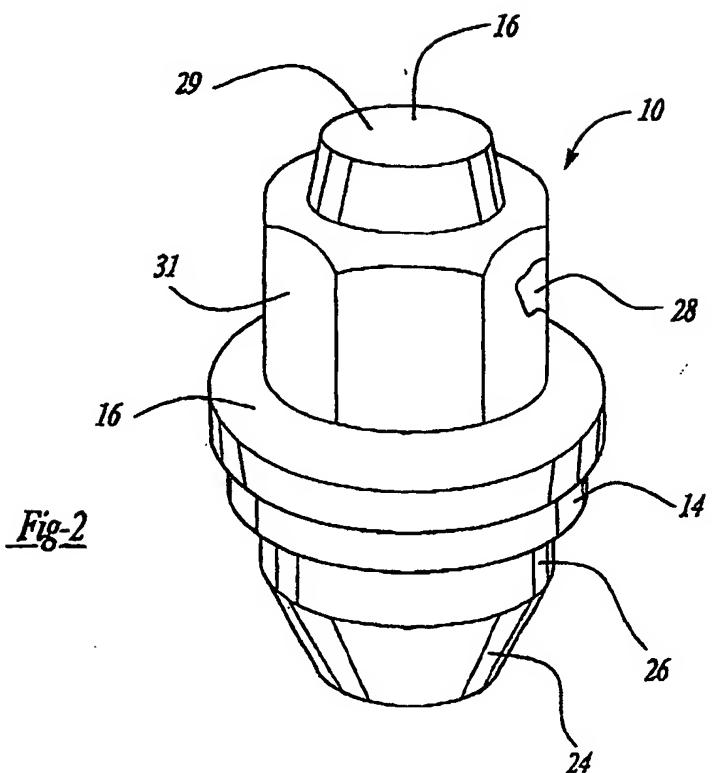
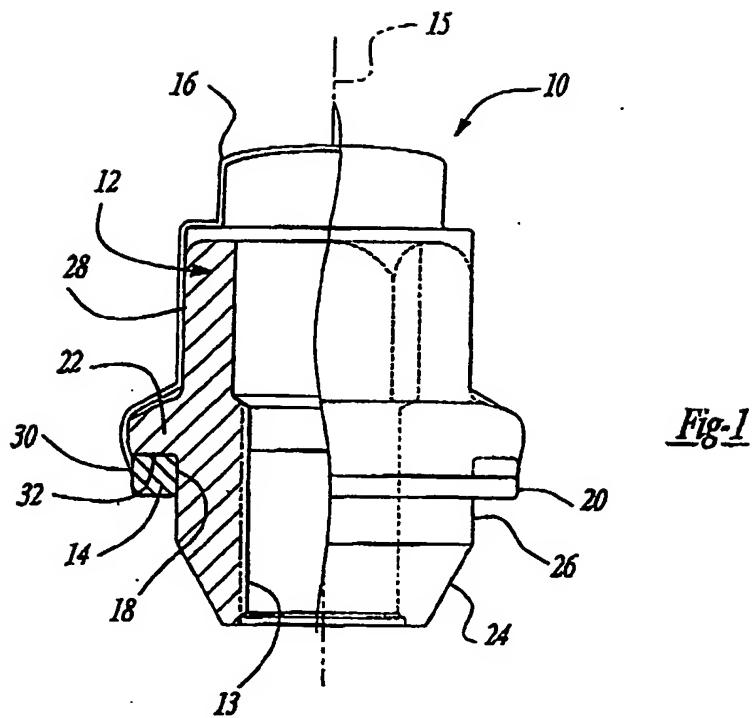
40

45

50

55

BEST AVAILABLE COPY



BEST AVAILABLE COPY

European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 99 10 2819

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category   | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.) |
|--|--|-------------------|---|
| Y  | GB 2 179 416 A (AUTO TURNED PRODUCT NORTHANTS LIMITED) 4 March 1987<br>* column 2, line 94 – line 114; figure 1 *  | 1,2               | F16B37/14<br>B60B7/06                       |
| Y  | EP 0 265 132 A (STEEPLESS SUPPLIES LIMITED) 27 April 1988<br>* column 3, line 11 – line 15 *<br>* column 4, line 17 – line 36 *<br>* claims 1,2,4,5,8,11,13; figures 5-7 * | 1,2               |   |
| A  | CH 374 858 A (NIENBURGER METALLWARENFABRIK ADOLF THIESS GMBH)<br>* page 2, line 58 – line 67 *<br>* page 2, line 74 – line 92; figure 1 *                                  | 1                 |   |
| TECHNICAL FIELDS<br>SEARCHED (Int.Cl.)   |  |                   |   |
| F16B<br>B60B   |  |                   |   |
| The present search report has been drawn up for all claims                       |  |                   |   |
| Place of search  | Date of completion of the search   | Examiner          |   |
| THE HAGUE  | 1 June 1999  | Martin, C         |   |
| CATEGORY OF CITED DOCUMENTS  |  |                   |   |
| X : particularly relevant if taken alone   | T : theory or principle underlying the invention   |                   |   |
| Y : particularly relevant if combined with another document of the same category | E : earlier patent document, but published on, or after the filing date  |                   |   |
| A : technological background   | D : document cited in the application  |                   |   |
| O : non-written disclosure   | L : document cited for other reasons   |                   |   |
| P : Intermediate document  | & : member of the same patent family, corresponding document   |                   |   |

EPO FORM 1600 CO. 2 (P04001)

BEST AVAILABLE COPY

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 10 2819

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The numbers are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-06-1999

| Patent document cited in search report | Publication date | Patent family member(s) |  | Publication date |
|--|------------------|-------------------------|--|------------------|
| GB 2179416 A                           | 04-03-1987       | NONE                    |  |                  |
| EP 265132 A                            | 27-04-1988       | US 4944644 A            |  | 31-07-1990       |
| CH 374858 A                            |                  | NONE                    |  |                  |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**BEST AVAILABLE COPY**